ON CULTIVATION

Report of Geo. R. Ewart to Planters' Association.

Conditions In Kauai—Methods of Handling Cane—Facts and Figures.

The following is the second part of the report of the Committee on Cultivation read at the meeting of the Planters' Association, November 20th, and written by manager Geo. R. Ewart of Kilauea Plantation, Kauai:

Makaweli, Kauai.

Hugh Morrison, Esq.,

Chairman of the Committee on Cultivation.

Our system of cultivation is quite different to most places on the weather side of the Islands, as we have to irrigate, and we have a little more bad weather than anywhere else. Being the most northerly point we are exposed to the North and North-west winds as well as the usual trade winds; the former we dread the worst, as they have a blighting effect on growing cane. A 24 hour's wind from the north or north-west will make cane appear as though it were drying up for want of moisture. It causes the change whether it is dry or wet weather. Fortunately such winds come only in the winter time. We have to irrigate in spite of the fact that we have an average yearly rainfall for the last 14 years of 72.17". Most of our rains fall during the winter months when the temperature is low and does us no good.

We store water, have three reservoirs of an area of over 60 acres, and an average depth of 27 feet. Our soils are of the "yellow and light red" varieties and an average depth of about 8". And while here, let us ask does it pay to cultivate deep on thin soils? We are told that yellow and light red soils do not retain moisture well; that being so the subsoils retain less and besides having no capillary power will allow the water to run through and it is lost to the plant. We have any amount of evidence that that is so, for all depressions and gulches commence to run water as soon as we begin to irrigate and drain ditches have to be cut in all such places. In dry summer weather (and that means hot weather with us as wet weather means cold) we cannot get water fast enough on our cane to get out all there is in the land. What with the drainage through the soil and evaporation, both through the cane and ground, there is no fear of doing any harm by water. We find that with deep cultivation (that is using the steam plow cultivators to a depth of say twenty inches and cross cultivating it) the land will take in more water, but as it runs through it, it is wasted.

If we could regulate the amount of water to a nicety, as they do at the experimental station, it would be all right, but you cannot do that, as you cannot depend on the watermen to put on just so much water, they will fill the furrow, the only way to prevent it is not to furrow deep, and we are doing it for two reasons: one, to reduce the quantity of water put on at one time, and the other to give the seed as deep a soil bed as we can so that some of the roots will be underneath the seed; we find that none of them penetrate the subsoil, they are all lateral from the seed, so where does deep cultivation come in, when the subsoil will neither hold the moisture nor the roots go into it? The more you loosen the subsoil, the more water it takes to fill the furrow and the more runs to waste. I may state I know of no plant growing here that has roots growing in the subsoil. We always plow to take up a little of the subsoil so as to increase the quantity of soil by each plowing. We commence plowing in the fall and harrow each field immediately afterwards so that when we come to plow it the second time before planting we find that the land well broken up and the second plowing and harrowing leaves the land clean and well pulverized. With new land we cultivate well before second harrowing. Land having maniania (Bermuda grass) growing cannot be harrowed clean, we have to hoe it out after we furrow. Our furrows are from 5 feet to 5 feet 6 inches apart.

Before planting we put in the furrows 800 pounds to the acre of pulverized mudpress cake and ashes. It analyses, Phos. acid, 3.16 per cent; Potash, 4.88 per cent; Nitrogen, 1.53 per cent. Analyzed by Dr. Averdam of Honolulu. We then run a single tined cultivator or subsoiler through the furrow mixing up the mudpress cake and ashes with the soil. Seed we place lengthwise in the furrow and overlapping a little but care being taken that the seeds do not touch each other, in case one seed spoils and affects the other. Cover lightly, following up with watering immediately and watering afterwards according to the weather, very dry, water again in five days and again in seven to eight days. Our big cane we try to water every twelve and fourteen days. We fertilize after the shoots are up say twelve inches with soluble fertilizer containing Phos. acid, 9 per cent; Nitrogen, 7 per cent; Potash, 2 per cent, putting 500 to 800 pounds per acre. The latter amount in two applications and in very poor places adding more. Sometimes Nitrate of Soda or Sulphate of Amonia.

SEED.

We find our best seed is good plump plant cane; there are less misses from that kind of seed than any other. We usually cut, say, plant cane this year and the ratoons of the same cane next year, fertilizing of course,and if the stand is good after the second cutting we fertilize again and use it; but we always find we do better from the original plant cane than from either of the ratoons.

STRIPPING.

We do this once and in gulches oftener. In dry seasons it does fairly well but it has one big disadvantage with us, and that is, the amount of dry, leaves that stick tight to the bottom of the cane, which cannot be knocked off with a knife, making it bad for milling and also more costly for cutting.

REPLANTING.

Re-planting, taking the plant cane we have just taken off, the first field, 350 acres, cost 13 cents per acre to replant. Commenced it June 14th. Second field, 337 acres, commenced July 14th. Cost 29 cents per acre. Third field, 206 acres, commenced August 16, costs $1.17 per acre. A great deal of the last field was not planted until October, as we had to wait for rains. The above showing is pretty much in keeping with our other years. Only we have some cold wet seasons when cane won't come up good, even in June. Regarding early or late planting, with us all fields planted after August require more care and are a source of greater anxiety than fields planted in June, July and August. Fields planted before the middle of June are liable to tassel in November; planted after the 15th we never have any tassels. So we begin the middle of June and try to finish in August.

MATURITY OF CROPS.

As is well known in agriculture, crops mature earlier on light, thin soils than on deep heavy ones, and so it is here. All kinds of cane that we have tried deteriorate just as soon as the full bloom of the tassel is gone. The Yellow Caledonia and Rose Bamboo start in to send out young shoots from the stool, so that a field of Rose Bamboo ratoons of 309 acres cut in March looked like a field of young cane growing, the men only cutting the mature sticks and leaving the young shoots. The difference in the same field in sucrose and purity, taken off in December and March, is as follows: December—Sucrose, 16.28; purity, 91.5. March—Sucrose, 15.73; purity, 87.3.

The piece taken off in December was only a small portion of the field—some eight or ten acres; the March lot was 300 acres. Lahaina does not send up any young shoots after tasselling; it simply dries up. The wetter and colder it is the quicker it goes bad and it is only in very good weather that we have any lalas. Rose Bamboo and Yellow Caledonia are both more liable to be turned over with wind than Lahaina, especially the Rose Bamboo, the wind turning it over roots and all, and, like all forced and quick-growing plants, the sticks are long and spindling and lie down a great deal. Yellow Caledonia stands up better than Rose Bamboo. Both Rose Bamboo and Yellow Caledonia are quick in starting, the shoots showing above ground earlier than Lahaina, growing vigorously right along; keeps a good color all winter and appears to stand the cold weather much better than the Lahaina. Altogether a very pleasing cane to grow, but terribly disappointing when you come to weigh it and put it through the mill. Rose Bamboo grinds badly in our mill; it seems to re-absorb the juice no matter how you run the mill, fast or slow, the hydraulic heavily weighted or not. Perhaps it would do better with rolls of smaller diameter, as the point of contact would be finer. My opinion of the two varieties is that they require a deeper soil than we have, and a longer time to grow. Their success in the uplands of Hamakua and Kau would indicate that, as they get such conditions, viz.: deep soil and long growth. When we first got Rose Bamboo and Yellow Caledonia they were from two to three weeks later in tasselling than Lahaina, but now they tassel at the same time.

RATOONS.

Ratoons can never be a sure crop with us. Our last crop of plant cane was perhaps the best ever taken off here and our ratoons one of the poorest. You will notice the rainfall and temperature of January, February and March, 1898, was not cane-growing weather; a great many of the stools so rotted that we deemed it better to take off what we could than to cut back and go in for long ratoons. From experience we have never been able to make long ratoons pay. One thing we notice that whenever for any reason our plant cane does not grow well from late planting, bad weather or any cause whatever, our ratoons are better than the other fields that have had the normal crops. It would seem as though the land was not able to sustain any more than so much whether plant or ratoons, and that, in spite of any fertilizers you can put on.

The weather this last spring was very favorable for ratoons; we had a dry winter and for the first three months of this year the mean temperature was 1.52 degrees higher than the three months of last year, and our ratoons never looked so well as they did in the spring; they have got a good start and we ought to have a good crop. So to us it would appear that long or short ratooning is more a question of soil and weather. We must take off our plant cane early, as it deteriorates so soon after tasselling, and the wetter and owrse the weather the quicker we ought to do it; so that with us we want good weather to ensure us a good start for our ratoons.

We cultivate our ratoons as follows: As soon as the trash is burnt off we start five plows between the furrows; then when the young cane is high enough we fertilize with 500 to 800 pounds of the same fertilizer that we use on the plant cane and with a double mouldboard plow we throw the dirt towards the cane, afterwards hoing it and watering between the cane.

It takes a great deal of water doing it that way in our thin soil, and we think that hilling up in the furrow would be better, and we are going to try that method next year. The last few years we have cleaned out all the gulches, cutting deep ditches up through the lowest parts, getting down below the boggy places. Limed them good with from four to eight barrels per acre, according to the condition of the place we have planted them, and have had good success. Some parts, where it was very sour land, the stools of the ratoons have rotted the first time, but cultivation improves that.

I may state that with us we must carry out the old dictum in irrigation, viz.: "Irrigate from the highest points and drain from the lowest." Every little hollow or gulch that we plant we must put in a drain ditch. In some cases we catch the drainage water and use it over again, and in one gulch of about a mile long we use it over three times. Liming the land is good; we are trying some experiments and will be able to give some data after our crop of 1901. We find we cannot crop continuously; no amount of fertilizer (mineral fertilizer) applied will give us a paying crop, say, after the first two crops; so we let the land to be planted lie over one year, applying all the refuse from the mill, waste molasses, surplus trash, sweepings from the cane-carriers, blood from the slaughter-house, stable manure and night soil from the quarters—anything and everything that will improve or make soil we put on the poor places in fields nearest to where the material is handy. If we had stable manure to cover all our lands we might, with mineral fertilizers, plant them right along; as there seems to be nothing to equal a dressing of stable manure plowed in and mineral fertilizer applied after the cane comes up. But stable manure, like trash from the mill, is very bulky, making it very costly to handle anywhere but near to where it is made.

SOILS.

Soil chemists say that the bacteria that prepare food for plants are active 18 inches from the surface; that being so, the question of crops ought to be one of arithmetic on the Islands, all conditions being equal—depth of soil, heat and moisture. Dr. Maxwell, in his work on "Lavas and Soils," page 185, gives the following table:

	No. of Acres.	Approximate Yield Sugar Per Acre.
Dark red soils	30,000	10,411 lbs.
Yellow and light red soils	32,000	6,291 lbs.
Sedimentary soils	20,000	10,301 lbs.

Most all dark red and sedimentary soils are deeper than 18 inches, and I think in tropical countries animal life goes deeper than in temperate ones, as cane and grass roots will be found at a greater depth than 18 inches in dark re dsoils. So we may take it that as eighteen inches and more of good soil is to 10,367 pounds of sugar (average yield of dark red and sedimentary soils) so is any number of inches to the answer. Yellow and light red soils produce more in proportion to the depth of soil than the dark red, etc., soils, as, no doubt, the cultivation has to be more thoroughly done; that will perhaps give food for thought to some folk who think and say that cane raising is only a matter of fertilizers. Granting that the first six inches of soil is better than the next six inches and so on, there is still a big difference in favor of the yellow and light red soils; in spite of the fact that dark red soils have the better climate on the lee side of the Islands.

I would suggest that there be experiments made on all kinds of soils on all of the Islands supervised by the Experimental Station, the same as agricultural experimental stations and colleges are doing in other parts of the world. The work could be done by the plantations the same as farmers are doing; but the directing and tabulating of results should be done by trained men. This thing of having an experimental station where conditions of soil, heat and moisture are altogether different to where the greater part of the Islands crops are grown is of little use. It is known that Ewa crops are large per acre; what we want to know is, can it be done or approached on yellow and light red soils? If so, how?